

Amendment
Serial No. 10/766,041
Attorney Docket No. 011470A

REMARKS

Claims 58-84 are pending. Claims 58, 60-62, 65 and 66 are amended. Applicants gratefully acknowledge that claims 77-84 have been allowed.

Claims 58-76 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-55 of US Patent No. 6,855,929 in view of Richardson, and were also rejected as being unpatentable over claims 1-60 of US Patent No. 6,593,152 in view of Richardson. Furthermore, claims 58, 60-62 and 68 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,038,018 and Richardson and claim 59 was rejected under 35 USC §103(a) as being unpatentable over Yamazaki and Richardson in view of Nakagawa. Favorable reconsideration of these rejections is requested in view of the amendments made herein.

Independent claim 58 has been amended to specify “a lens and a deflector for deflecting the secondary electrons between the beam separator and the detector.” The cited art fails to teach or suggest the features of amended claim 58. Accordingly, it is believed that the amended claims have overcome the above-noted rejections.

Claims 63-67 and 69-76 were rejected under 35 USC §103(a) as being unpatentable over Yamazaki and Wada in view of Petric and in further view of Tanaka. Favorable reconsideration of this rejection is earnestly solicited.

Claim 63 contains the limitation “a mechanism for adjusting a beam diameter and a beam current of the primary electron beam to maximize an S/N ratio in a particular pattern in an electric signal of the secondary electron beam detected by said detector, wherein the beam diameter and the beam current are adjusted by changing a brightness of the electron gun, and the electron beam apparatus has a plurality of particular patterns, one of which is selected and used to determine the beam diameter providing the maximum S/N ratio”.

Wada describes a technique that a beam diameter, astigmatism, and a beam axis are adjusted using a plurality of test patterns. However, Wada does not disclose that both of a beam diameter and a beam current are adjusted to maximize an S/N ratio. None of the other references discloses it, either. Namely, none of the references describes that as a beam current is increased by increasing brightness of a beam emitted from an electron gun, a beam diameter is increased by a space-charge-effect, and thus is intended to adjust both of the beam diameter and the beam current to maximize an S/N ratio.

In an SEM, it is possible to set a monitoring time period for a sample to be relatively long, and in such a case adjusting only a beam diameter is enough to obtain a high resolution of a sample image. On the contrary, in the invention which is an electron beam apparatus for inspecting a sample, a high throughput is required, and a high S/N ratio is required to accurately inspect the sample.

The relationship between an S/N ratio and an inspection time duration T can be represented by $S/N \propto T^{1/2}$. If an S/N ratio is larger, and inspection time period can be reduced

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and thus a high throughput can be realized. On the contrary, if an S/N ratio is smaller, it is necessary to set the time period to be longer to obtain a higher S/N ratio, in which case a throughput is lower. Accordingly, a high S/N ratio for a fixed inspection time period is more important than a beam diameter in an inspection apparatus.

Therefore, it is important to set both of the beam current and beam diameter to maximize the S/N ratio when a line and space pattern which is substantially the same as that of a target sample, is scanned in an inspection apparatus.

For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by applicants would be desirable to place the application in better condition for allowance, the Examiner is encouraged to telephone applicants' undersigned attorney.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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